

APPLICANT'S INVENTION

The invention relates to quantitative dosing of small amounts of liquids having a volume of microliter or nanoliter order. Such a dosing technique is useful for instance for productive serial dosing in applications of clinical chemistry. In the dosing device of the invention, flexible bellows attached to a body define a liquid space filled with a liquid to be dosed and communicate with a dosing tip. The bellows are provided with an actuator for operation thereof, constricting the liquid space to cause a liquid dose to be discharged from the dosing tip. In the dosing device of the invention, the actuator is formed of a magnet and a current coil, one of the parts of the actuator being attached to the body of the device, and the other part being movably connected to the moving end of the bellows. The magnetic actuator generates the movements of the bellows by changing the magnitude of the electric current passing through the current coil. To linearize the movements of the end of the bellows, a centralizer formed of equally spaced helical springs may be arranged between the body and the moving parts of the dosing device. The invention is further directed to a dosing method based on movements of bellows moved by a magnetic actuator,

and to a method wherein liquid is dosed as individual small droplets from the dosing tip by first accelerating and then by slowing down the motion of the bellows by means of the actuator. The invention may for instance be applied in the production of test strips used in chemical analyses.

THE REJECTION

Claims 11-15 and 17 are rejected to under 35 U.S.C. §112 for failure to comply with the written description requirement.

Claims 11-15 and 17 are rejected under 35 U.S.C. §112 as being indefinite for failure to particularly point out and distinctly claim the subject matter which Applicant regards as the invention.

Claim 15 is rejected as a double inclusion for reintroducing limitations of Claim 11.

Claims 1-4, 9-13, 15, 17-19 and 21 are rejected under 35 U.S.C. §102(b) as being anticipated by Sgourakes, U.S. Patent 5,641,270.

Claims 14 and 20 are rejected under 35 U.S.C. §103(a) as being unpatentable over Sgourakes as being obvious to one of ordinary skill in the art.

DISCUSSION

In the Office Action dated July 10, 2006, the Examiner objected to Claims 5 through 8 and 16 as being improperly dependent. In the responsive filing filed October 10, 2006, Applicant addressed the multiple dependency of these claims and amended same. Despite this submission, the Examiner has not addressed these amended claims in the Office Action dated December 21, 2006, and further states that they are withdrawn from consideration. Applicant has included these claims because Applicant believes that they are allowable claims and that the amendment filed October 10, 2006 placed these claims in their correct dependency and therefore Applicant includes these claims for consideration.

Applicant takes exception to the Examiner's rejection of Claims 11-15 and 17 under 35 U.S.C. §112 as failure to comply with the written description requirement. It is correct that the bellows basically works by a back and forth movement, constricting and expanding. However, constriction as well as expansion takes place within a one dimensional range of movement of the bellows which can be subdivided into an amount

of shorter steps which are used for serial dosing. The language of Claims 11 through 15 and 17 are fully supported in the specification at page 8, lines 4 through 24, and Applicant would therefore respectfully submit that this rejection is obviated.

Claims 11-15 and 17 are rejected under 35 U.S.C. §112 as indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. Applicant has amended Claim 11 to address this rejection and respectfully submits that as a result of the amendment to Claim 11, this rejection is obviated.

Claims 1-4 and 9-13, 15, 17-19 and 21 are rejected under 35 U.S.C. §102(b) as being anticipated by Sgourakes. The Sgourakes reference describes a pump comprising a flexible bellows (28), which is provided with an inlet (36) and an outlet (27) for the fluid being pumped and which is surrounded by a working fluid (32). The bellows is driven by a magnetostrictive element (12) provided with a magnetic field generating coil (18). The magnetostrictive element (12) has no direct contact with the bellows (28), but driving of the latter takes place through the working fluid (32). The magnetostrictive element (12) brings about an increase in the

working fluid pressure, thus increasing the pressure on the bellows (28) and pumping fluid out of the bellows through the outlet conduit (27). The Sgourakes '270 patent differs from Applicant's invention in that it fails to disclose a direct connection between one part of the magnetic, two-part actuator, and a bellows, so that the spring force of the bellows is acting against the actuator. In Applicant's invention, changing the current passing through a current coil of the actuator thus alters the force acting against the spring force of the bellows and causes a controlled bellows movement and produces dosing of a selected volume of liquid. Such a procedure is not disclosed nor suggested by the reference. Neither is there any description or suggestion of a serial dosing by successive movements of the bellows in one direction as taught by the Applicant.

In order for a prima facie case of anticipation to be established, there must be a single reference that teaches or enables, each of the claimed elements (arranged as in the claim), expressly or inherently, as interpreted by one of ordinary skill in the art. The Sgourakes reference is indeed a single reference, but it fails to the other tests for anticipation in that it fails to teach or enable each of the

claimed elements as arranged in Applicant's claims either expressly or inherently as interpreted by one of ordinary skill in the art for the reasons set forth above.

In order to establish a prima facie case of obviousness, it is necessary to provide one or more references that were available to the inventor, and that teach a suggestion to combine or modify the references, the combination or modification of which would appear to be sufficient to have made the claimed invention obvious to one of ordinary skill in the art. The Sgourakes '270 reference fails this test in that it does not teach the structure and function as claimed by Applicant, nor does it suggest a modification of its own structure and function in order to perform as described, disclosed and claimed by Applicant, and since Sgourakes '270 is a single reference, there is no other reference with which it can be combined, nor is there any suggestion within the Sgourakes '270 patent alone, for such a combination which would result in Applicant's structure and function.


In light of the amendment to the claims, and the distinguishing differences between the Sgourakes '270 patent and Applicant's structure and function, Applicant would respectfully submit that the application and the claims

presented are in condition for allowance and a notice of same
is respectfully solicited.

Respectfully submitted,

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